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EX PARIE

July 24, 1996

Mr. William F. Caton
Secretary
Federal Communications Commission
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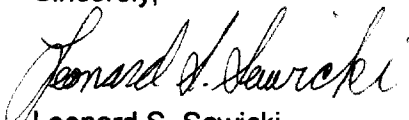
Re: CC Docket 96-98: Implementation of the Local Competition Provisions of the
Telecommunications Act of 1996

Dear Mr. Caton:

The attached paper was prepared in response to a request made by the FCC staff on July 3. The paper, Depreciation and Capital Recovery Issues, analyzes the Reply Affidavit of Jerry A. Hausman.

Please include the enclosed copies on the record of this proceeding.

Sincerely,


Leonard S. Sawicki

Attachment

cc: Mr. DeGraba
Mr. Farrell
Mr. Rosston

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JUL 24 1996

Depreciation and Capital Recovery Issues

A Response to Professor Hausman

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July 24, 1996

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Prepared on behalf of MCI.

I. INTRODUCTION

In his May 30 Affidavit to the Commission, Jerry Hausman raises two issues concerning appropriate capital recovery costs incorporated into TSLRIC-based rates for unbundled elements of local telephone service.¹ He argues that (1) TSLRIC studies are inherently incapable of correctly dealing with depreciation when the price of capital goods is expected to fall over time,² and (2) there is a substantial option value that ought to be, but is not, included in the capital recovery component of TSLRIC costs.

Regarding the depreciation issue, we conclude that Hausman is simply wrong in his claim that TSLRIC can accommodate nothing but straight-line depreciation. When all reasonable evidence indicates that the prices of capital goods can be expected either to fall or rise, it is straightforward to use other-than-straight-line depreciation in TSLRIC capital recovery calculations. Indeed, depreciation schedules that appropriately reflect the expected trends in the price of capital goods can produce higher prices in some settings, and lower ones in others, but in all cases prices that more accurately reflect true scarcity.

Regarding the treatment of options and their value in determining appropriate capital recovery prices, we find Hausman's discussion neither informative nor helpful. We readily recognize that the ILECs do, when they make any investment, create options for their customers. But this is true whether the CLECs are among their customers or they have only their traditional customers. Once this is acknowledged, there is no reason to alter the CAPM-based cost of capital estimates that are currently used. If these models previously produced satisfactory capital recovery for the ILECs, they still should. Only in limited circumstances, which we discuss, may any adjustment be warranted.

II. DEPRECIATION

TSLRIC studies can incorporate other-than-straight-line depreciation in a straightforward way. Thus Hausman's criticisms of TSLRIC raise empirical questions, but do not, as he asserts, present fundamental problems with TSLRIC methods. If the prices for capital goods are expected to change, it is a mistake to require that straight-line depreciation be incorporated into the regulated output prices. Hausman correctly notes this. He is in error, however, when he claims that an expected decline in the price of capital goods would require that depreciation expense be higher in all years. For a given expected useful life, accelerating depreciation entails higher depreciation charges in the early years of an asset's life, but lower ones in the later years. If

¹See *Reply Affidavit of Jerry A. Hausman*, In the Matter of Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, CC-Docket No. 96-98.

²Hausman asserts that "...a TSLRIC calculation...assumes that the price of capital goods does not change over time." *Ibid.*, p. 4.

falling prices for capital goods are incorporated into TSLRIC, the resulting price schedule will reflect higher depreciation expense in the early years, and result in higher user prices, and lower depreciation expense and user prices in the later years.³ The asset lives themselves are subject to little dispute; there is evidence that the difference between regulators' and LECs' estimates of useful assets' life is quite small, and that most of the differences occur in subscriber metallic cable, not in other asset classes such as switches.⁴

We accept the proposition that if prices of capital goods are expected to decline, then accelerated depreciation is called for. However, there are several reasons to believe that the adjustments to TSLRIC costs, if any, will be small. First, Hausman provides no evidence that the prices of capital goods purchased by the ILECs are expected to decline in the future. His numerical examples apply recent switch price decreases to all telephone plant, even though he presents no evidence on past or expected future price trends for other capital goods. In addition, some knowledgeable observers predict that switch prices will decline very modestly over the next five years or so.⁵ Second, any claims from the ILECs concerning future capital goods price declines should be consistent with those same ILECs' productivity projections for price caps.⁶ Third, Hatfield's TSLRIC cost estimates are not particularly sensitive to changes in the cost of capital goods, so average costs over a multi-year period should not be very sensitive to shifts of depreciation expense across years.

Regulators may be inclined to revisit depreciation policy on "fairness" grounds. If switch price depreciation has been too low in the past, they may feel that some compensation is called for. If the Commission and state regulators decide to revisit depreciation policy, they should do a complete job, and not limit their inquiry to adjustments that provide a financial benefit to the LECs. Other aspects of depreciation deserve attention. In particular, conventional straight-line depreciation produced cross-subsidies from monopolized to competitive services. We have in

³For a theoretical treatment of the necessity for accelerated (or front-loaded) depreciation when capital goods prices are declining, see Crew and Kleindorfer, "Economic Depreciation and the Regulated Firm under Competition and Technological Change," *Journal of Regulatory Economics*, vol. 4, March 1992.

⁴See Baseman & Van Gieson, "Depreciation Policy in the Telecommunications Industry: Implications for Cost Recovery by the Local Exchange Carriers." MicRA Research Report, December 1995.

⁵*The U. S. Central Office Equipment Market*. Northern Business Information, January 1996.

⁶It is not immediately obvious how USTA will reconcile Hausman's projection of enormous expected future price declines for all capital purchased by ILECs with USTA's recent positions in price cap proceedings that future productivity growth for the LECs will be very moderate.

mind especially assets that were put in place ahead of expected use. We do not dispute that such investments may have been efficient. To the extent the equipment in telephony comes in lumpy increments, it is efficient to invest early, live with underutilization for a while and, in doing so, realize the benefits of scale economies (lay more cable than is presently needed while the ditch is open). But then to apply straight-line depreciation as soon as the asset is placed in use is not appropriate and results in prices that are inefficiently too high in the earliest years of the asset's life. Here the pattern of depreciation to be included in regulated product prices is one which starts low, then rises, and then falls, reflecting increasing use in the early years, and declining capital prices in the later years. To fail to have prices correctly reflect usage results in today's customers partially paying for capacity put in place to serve tomorrow's customers.

In the old regime of regulated local telephony, especially given the substantial overlap in the identity of today's and tomorrow's customers, these cross subsidies resulted in little distortion. However, the approach allows cross subsidies that are potentially distortionary in the new regime. It makes sense that the LECs will want to have capacity in place, and be ready to serve the long-distance market as soon as they have the freedom to do so. However, the costs of that capacity should be paid for entirely from the LECs' *future* long-distance revenues.⁷ Current regulatory practice fails to require that separation. Indeed, since the switching and transport investments can also be used for local and intra-LATA services, current customers of those services are now paying the depreciation expenses for capacity put in place to serve the future long-distance market.⁸ For (forward-looking) efficiency, the costs of such capacity should be excluded from the costs of unbundled elements for local service (as happens in Hatfield's TSLRIC study which sizes the network to provide only local narrowband services). For (backward-looking) fairness, it is likely that local service customers are entitled to refunds to reverse their past contributions to this cross-subsidy.⁹

III. OPTION VALUES AND TSLRIC

Hausman's most intense criticism is directed at the DOJ and IXC's for their alleged failure

⁷The same argument applies to other potential cross-subsidies, such building broadband plant before there are revenues from video or other broadband services, yet charging depreciation expense to the cost of basic local services.

⁸Selwyn and Kratvin have provided evidence suggesting that this cross-subsidy concern is a very real one. The LECs' rate of investment in new equipment has far outstripped the growth in demand for services they are now allowed to offer. See Lee Selwyn and Patricia Kratvin, *Analysis of Incumbent LEC Embedded Investment*, Economics and Technology, Inc., filed with AT&T Reply Comments in CC Docket No. 96-98, May 30, 1996.

⁹Prices are not subsidy-free if a group of customers pay more for service than the TSLRIC of a network designed to serve only that group.

to understand the importance of option value in investment decisions. When investments are irreversible (i.e., costs are sunk), the act of investing extinguishes the option of waiting and investing (or not) later. This option has value, and the return to investment should include the value of the now-foregone option to wait.¹⁰ Hausman emphasizes that investment on the part of the ILECs, together with the new legislation, give the CLECs the *option*, but not the *obligation*, to use the investments the ILECs have made.¹¹ Hausman argues that the CLECs should be required to pay the ILEC a premium in excess of TSLRIC to compensate the ILEC for bearing the risk associated with the new investment over its full economic life

We agree that investment by the ILECs gives the CLECs options. But we would also argue that the ILECs have always given their customers exactly these options. The ILECs' traditional telephone customers made no long-term commitments to the ILECs. They have always had the option, but not the obligation, to have telephone service, and the right to disconnect their phones or reduce usage. Thus, if the prior TSLRIC calculations resulted in adequate capital recovery to ILEC investors, they need not be altered. Indeed, all business enterprises give their customers options. The local supermarket, for example, gives customers the option to buy all sorts of perishable food. Some of these options expire worthless; that is, they spoil or are discarded. Investments are made, not knowing whether or how much customers will buy. On average, returns to these investments cover costs, including the costs of options the customers do not exercise. Telephone services are not different.

¹⁰For discussions of the "investments as options" literature, see Avinash Dixit and Robert Pindyck, *Investment Under Uncertainty*, Princeton University Press (1994) and R. Glenn Hubbard, "Investment Under Uncertainty; Keeping One's Options Open," *Journal of Economic Literature*, December 1994, pp. 1816-1831.

This literature emphasizes the role of one-way bets in some investment decisions. That is, in certain circumstances an investment's upside is more limited than its downside, and the investor rationally requires a premium to undertake the investment (and extinguish the option not to invest). The literature includes full models of the "monopoly" case, where only one firm has the option of making the investment, and the "competitive" case, where many firms can invest and each knows that if it does not invest, other firms may. The one-way bet in the monopoly case arises from waiting for better information while deferring the investment. If later information shows the investment to be a good one, it can still be made. So the costs of waiting are low. However, if the new information shows the investment to be a bad one, an expensive mistake has been avoided. In the competitive case, the asymmetry is said to arise because if uncertainty is resolved against the investment, the firms having made it suffer losses (since the investment is irreversible). If uncertainty is resolved in favor of an investment, incumbents expand and new entry occurs, which puts a limit on the profits to be realized.

This literature does not include complete models of oligopoly situations, where there may be advantages to moving first. Dixit and Pindyck recognize that such first-mover advantages might reverse the analysis, creating an advantage to investing early.

¹¹Hausman, *op. cit.*, p. 2.

This perspective informs a deeper understanding of exactly what “option value” issues arise with the entry of the CLECs into local telephone service. If the choice is for the ILEC to lease capital to a CLEC or to use that capital to serve local customers directly, the only factor that could justify altering the TSLRIC price to the CLEC is its greater willingness to commit to a long-term contract. In this case, of course, the price should be adjusted *down*, not up, because any failure for the CLEC’s customers to fully utilize the capacity that the CLEC has leased is the CLEC’s problem, not the ILEC’s. In other words, the CLEC has assumed the risk associated with the option from the ILEC, and the ILEC now need no longer charge for it.¹²

The situation in which a substantial *ex ante* adjustment to the TSLRIC prices for future investments¹³ might be in order is limited to circumstances where, as a result of leasing equipment to the CLEC, the ILEC experiences a decline in capacity utilization that otherwise would not have occurred. For example, the classic complaint of the LECs is that it is the intent of the CLECs to lease equipment from them for a few years, steal their customers, and then build their own

¹²A customer making a term commitment thus has earned a discount (below a Hatfield TSLRIC) because it is bearing risks that the ILEC was paid to bear in the circumstance where customers did not make term commitments.

It is easy to see why customer commitments shift risk from seller to buyer. Suppose in a world with no commitments, a local recession reduced demand by 10%. Then (with binding price caps), the ILEC’s revenues fall 10%. However, if 20% of the customers’ volume entailed term commitments, then in the same local recession, the ILEC loses 10% of revenues on the uncommitted volume, but suffers no losses on the committed volume, resulting in a revenue loss of less than 10%.

CLECs should also receive additional discounts if the capacity rights they commit to are less valuable than the capacity rights retained by the ILEC. An example is where the ILEC retains the right to use capacity committed to the CLEC in the event the CLEC is not using it, but the CLEC does not obtain a similar right to access unused ILEC capacity. To see how this could work, suppose a CLEC has rented rights to 20% of a switch’s capacity. If the ILEC retains the right to use more than 80% of the switch’s capacity in the event the CLEC is not using it, the ILEC has “use it or lose it” rights with respect to that capacity. If the CLEC does not have similar rights to unused ILEC capacity in the switch, then discounted terms should govern the price paid by the CLEC for capacity rights, since those rights are less valuable than the capacity rights retained by the ILEC. The ILEC benefits from asymmetric “use or lose” provisions because the capacity costs to serve its own demand fall. That is because, to the extent that the ILEC is able to sometimes serve its customers with capacity that others have paid for, the ILEC’s ratio of own capacity to output is reduced.

¹³We wish to stress that here we are dealing with the criticisms Hausman levels against TSLRIC pricing principles for future investments. We are not addressing the stranded cost issues associated with the ILECs’ embedded plant. We disagree with Hausman on that issue as well, but that is not the subject of this paper.

equipment, leaving the LECs with unused, and presumably unpaid for, capacity.¹⁴

While we cannot rule out such a scenario, we believe it is reasonable to ask: Why would the CLECs ever build their own equipment if the ILECs could do it cheaper? Perhaps because the ILECs are not cooperating with them? Is it reasonable to allow the ILECs to charge the CLECs more to lease the ILECs' equipment because their own uncooperative behavior is going to drive the CLECs *to build their own equipment*? It seems that to allow this would only increase the likelihood of cooperation failure. By charging the CLECs higher prices to start, the ILECs give them further incentives to build their own equipment, which makes the ILECs all the more eager to collect whatever they can from the CLECs, while they can. "Solving" the possible problem of redundant capacity by raising the price on rented capacity would thus be truly perverse.

There are more reasonable ways to address the issue. Under what conditions would an ILEC's TSLRIC costs associated with a current investment (the "facility") be increased as the result of input sales to competitors? The necessary conditions include

- 1) more customers end up being served in the future by facilities owned by someone else than if the input sales were not made,
- 2) the ILEC's future expected capacity utilization for the facility unavoidably falls as a result, and
- 3) the ILEC's average cost for the facility increases due to the fall in capacity utilization.

As long as the CLEC continues to use the ILEC's facilities, of course, any capture of customers by the CLEC or customer switching between the ILEC and the CLEC, will not affect the demand for, or capacity utilization of, the ILEC's facilities. Thus the first condition rules out any effects from resold local service, as well as any effect from the sale of unbundled elements so long as the ILEC's facilities are used.

With respect to the second condition, it might seem self-evident that the construction of facilities by a CLEC to serve its local customers would always reduce the rate of capacity utilization of the ILEC's facilities. But it is not so simple. In some plausible situations, the defection of ILEC customers in the future to the CLECs will increase the ILEC's capacity utilization (and reduce the ILEC's costs). The CLEC's decision to build its own capacity in the

¹⁴The potential problem of redundant capacity can be ameliorated by treating TSLRIC prices as a schedule of maximum prices. If an ILEC's short run incremental cost is less than TSLRIC (as may occur if the ILEC has excess capacity), then society, the ILEC and the CLECs are all better off with a uniform price for unbundled elements set below TSLRIC. Society, the ILEC and the CLECs share an interest in avoiding redundant capacity. At a price for unbundled elements less than TSLRIC, society benefits because redundant capacity is not built, the ILEC benefits because some margin over short run incremental cost is better than no revenues and stranded investment, and the CLECs benefit because (at least until the ILEC no longer has excess capacity), they receive prices below the costs (TSLRIC) at which they could build their own facilities.

future will reduce the need for the ILEC to build capacity. As a result, the ILEC's expectation of future lost sales to other CLECs reduces its expected rate of growth. Since telecommunications capacity is often added in lumpy increments, capacity utilization over time can be a decreasing function of the rate of growth.¹⁵ In that case, if the ILEC's growth rate slows (but does not turn negative), its average cost is in fact reduced by the future loss of sales to the CLECs. The ILEC can defer investment that, if made, would cause it to enter the high cost, high excess capacity portion of the capacity cycle

The third condition is not met if the ILEC can quickly resize its facilities at low cost.¹⁶ The second and third conditions jointly are not met if the contract provisions with the CLEC combine sufficient term length and/or termination notice to allow the ILEC to revise its facilities plan at low cost to take into account the changed requirements.¹⁷ Indeed, when the ILEC's capital recovery would be too low at TSLRIC-based spot prices, the efficient answer is not only to raise the spot rental price and stop there. As already noted, this is sure-fire way to induce cooperation breakdown even when it is socially efficient for the ILEC to build the facility. Rather, term commitments and /or termination notice provisions are the efficient solution. And, also as already noted, customers making adequate commitments would pay less than TSLRIC because they are bearing risks for which the ILEC would otherwise be compensated in a

¹⁵Consider a simple example. Assume no scale economies. If capacity is most efficiently added in discrete increments then an ILEC facing zero demand growth achieves minimum cost *for it never has to carry the costs of excess capacity for future growth*. Similarly, an ILEC facing low demand growth can achieve lower costs than an ILEC facing high growth, for the low growth ILEC never has to carry much excess capacity, and can achieve costs almost as low as the zero growth company.

Now we are not suggesting that low growth ILECs will always have lower costs than high growth ILECs. There are cases where high growth generates lower costs. However, we are warning that the intuitive view that lower capacity utilization will always be the result of CLECs' expansion is not a valid generalization.

¹⁶It may well be that the physical elements of the ILEC's networks that the CLECs are most likely to replace with their own facilities (switches) are, because of modern modular designs, also the network components that are easiest for the ILEC'S to reconfigure at low cost; while the network elements with the least short term cost flexibility for the ILEC'S (distribution loop) are also the elements where the CLECs are most likely to rely on the ILEC's facilities for a long time.

¹⁷In a steadily growing market, such as local telephony, it is far easier to accommodate at low cost changes in future requirements based on the decisions of individual customers to take their business elsewhere. So long as the lost business is less than expected growth, the seller can simply forego investments in additional capacity it otherwise would have made.

competitive context (via the risk-adjusted rate of return).¹⁸ These topics are revisited in the final section of this paper.

With respect to the cost of capital issue, the realization that virtually all businesses give their customers options is especially helpful. In particular, it suggests that if businesses have successfully compensated investors in the past, we need not now think that the cost of capital is higher than we previously believed. Indeed, work on the CAPM has long noted that firms in industries that involve large sunk costs and irreversible investments tend to have higher betas, and therefore higher costs of capital.¹⁹

Hausman, however, would have us believe that not only should an option value be incorporated into TSLRIC, but that a “TSLRIC calculation which ignores the sunk cost feature of telecommunications network investments would thus be off by a factor of two.” Hausman’s ruminations on this issue are particularly misleading. The flaws deserve some attention.

The “factor of two” claim is based on a numerical example that Hausman borrowed from Dixit and Pindyck. The numerical example was constructed to be extreme in order to demonstrate option value to students. The example is not relevant to the policy issues at hand. First, it was based on complete monopoly, where only one firm could make the investment decision, whereas the situation we address here is one in which numerous firms could make the investment. Second, the example involved only fixed costs, and no variable costs at all and, thus, overstates any option value. Third, the example involved arbitrarily chosen parameter values of no relevance to telephone companies or their regulators.

Hausman’s claim that corporate hurdle rates generally include a substantial option premium is not correct.²⁰ Moreover, why he believes this apparently involves a shocking error on his part. His claim comes from a study by Summers, who surveyed CFOs of large U.S. corporations and asked them to report the after-tax *nominal* hurdle rates they used in investment

¹⁸Consider a competitive market. When a customer’s demand is large relative to the seller’s capacity, the seller faces the need to build new capacity to meet the customer’s requirements. If the investment is long-lived and irreversible, and the buyer does not agree to term commitments and/or adequate termination notice to allow the seller to adjust its facilities requirements, then the customer will pay a high price (above TSLRIC) or the seller will not build the facility. However, when the customer commits to an adequate contract length and/or offers adequate notice of termination, the price will be low (below TSLRIC) because the buyer is now bearing risks that a seller would ordinarily bear and receive compensation for in a risk-adjusted rate of return.

¹⁹See Brealey and Myers, *Principles of Corporate Finance*, McGraw-Hill (1988), pp. 190-1.

²⁰See Hausman, *op. cit.*, at p. 7.

decisions.²¹ They reported a mean rate of 17%, with a modal rate of 15%. Hausman claims that these rates far exceed the cost of capital.

But they do not. The CAPM cost of capital for a company of average risk (beta equals one) is just the risk-free rate plus the equity premium. The *real* riskless rate has averaged 1.0% over the last sixty years. The equity risk premium for large companies such as those surveyed by Summers has averaged 7.4%, for a total average real return of 8.4%.²² To compare these *real* (net of inflation) figures to Summers' *nominal* (gross of inflation) ones, we must subtract expected inflation from the nominal rates. To estimate expected inflation, we look to the ten-year government bond rate at the time of the study (1985), which was 10.62%.²³ The average real return on such bonds has been about 2%, which implies expected inflation of 8.6%.²⁴ Subtracting 8.6% from Summers' mean nominal hurdle rate of 17% gives a real hurdle rate of 8.4%, *identical to the CAPM cost of capital*. There is no mystery to be explained by an options premium. The only mystery is how Hausman confused nominal and real rates of return.²⁵

²¹See Lawrence Summers, "Investment Incentives and the Discounting of Depreciation Allowances," in *The Effects of Taxation on Capital Accumulation*, Martin Feldstein, Ed. (Chicago), University of Chicago Press, 1987.

²²See Ibbotson Associates, *Stocks Bonds Bills and Inflation*, 1995 Yearbook, Table B-1 at p. 157.

²³*Economic Report of the President*, 1993. Table B-69 at p. 428.

²⁴Ibbotson Associates, *Ibid.*, Table 6-6 at p. 118.

²⁵The options literature is fairly new, and there does not yet appear to be any consensus on its significance for estimating firms' costs of capital. The literature, however, does include an empirical attempt by Pindyck and another co-author to estimate the increase in the cost of capital (or the capital recovery factor) necessitated in the multi-firm context, by the options value created by irreversibility and uncertainty. In U. S. industries generally, Caballero and Pindyck "find that a doubling of industry-wide uncertainty raises the required rate of return on new capital by about 20 percent." (See Caballero and Pindyck, "Uncertainty, Investment, and Industry Evolution," Discussion Paper, MIT and NBER, September 1995.) It is not clear the extent to which these results are inconsistent with conventional CAPM estimated costs of capital for their sample. However, because betas are sensitive to sunk costs, we would expect CAPM costs of capital estimated on the same sample to show a similar pattern.

Another paper finds that price uncertainty does not affect investment in any but the most unconcentrated market. When the four-firm concentration ratio exceeds 20%, the effect of price uncertainty is "always small and not significantly different from zero." The authors' conjecture that, as Dixit and Pindyck argue, the option value to waiting is important in structurally competitive industries, but due to strategic issues and first-mover advantages, the theory does not hold up in even modestly concentrated industries. See Ghosal and Loungani, "Product Market

IV. MORE ON ONE-WAY BETS

Hausman asserts that proponents of TSLRIC are trying to impose an unfair, one-way bet on the ILECs. He argues (p. 2) that the ILECs are compelled to invest using today's technology, yet the CLECs can wait without risk, buy unbundled elements at TSLRIC from ILEC and, if quality-adjusted equipment prices fall, the CLECs can invest in the future using the newer, cheaper technology, or simply request reductions in element prices based on the new, lower TSLRICs. But Hausman merely asserts, and does not demonstrate, that this is a one-way bet. If equipment prices rise, or if costs of installing loops increase, then TSLRIC will increase, and under TSLRIC pricing, the ILECs are allowed to increase their prices for unbundled elements whenever the pricing of the elements is revisited.²⁶ This will provide the ILECs with an unanticipated profit, since they invested before the increases in unbundled element prices were known. In order to make the investment a fair bet for the ILECs, expected changes in the future cost of the elements should be taken into account in setting TSLRIC prices. But assuming that has been done, TSLRIC does not force a one-way bet on the ILECs, and there is no reason for an option premium.

Hausman also alleges that TSLRIC studies expose the ILECs to uncertainty over demand, but do not compensate the ILECs for assuming this risk. This allegation reflects a misunderstanding of Hatfield's TSLRIC methodology. The Hatfield model estimates an annual TSLRIC cost for the local carrier. The plant is sized to service current demands, with initial fill rates set to accommodate future growth. Thus, for a particular piece of the network, Hatfield may assume a 60% fill rate, whereas additional investment is not needed until the fill rate reaches (say) 85%. In that case, Hatfield's TSLRIC price (for the first and all subsequent periods!) is based on a 60% fill rate. In fact, with demand growth, the asset will realize higher average fill and, therefore, lower average unit costs over its lifetime. In short, with respect to demand uncertainty, Hatfield's TSLRIC methodology entails a one-way bet favoring the ILEC. The ILEC captures the cost savings from increased utilization in future periods, but does not share those savings in reduced TSLRIC prices. The ILECs' only offsetting risk is that demand for use of its local telephone facilities may actually fall; (i.e., market demand growth will be less than the loss of sales to facilities-based local competitors.) This risk seems very low given the rapid growth in demand for local service, which flows from population growth, increased long distance traffic, and the increase in multiple lines to accommodate increasing use of Internet and on-line services.

Competition and the Impact of Price Uncertainty on Investment: some Evidence from US Manufacturing Industries." *The Journal of Industrial Economics*, June 1996, pp. 217-228.

²⁶MCI has proposed that the initial unbundled element prices remain in effect for three to five years. See *Comments of MCI Corporation*, CC Docket No. 96-98, May 16, 1996 at p. 68.

V. CONCLUDING COMMENTS

We have demonstrated that Hausman's depreciation and option value arguments contribute little to our understanding of appropriate policy in the telecommunications arena.

With respect to depreciation of capital goods, it is clear that if capital good prices are expected to fall, accelerated depreciation is in order. Accelerated depreciation by itself does not change the useful life of equipment and, thus, depreciation will not be higher in all years, as Hausman erroneously claims, but only in the earlier years. Although it is an empirical question the magnitude of any such changes to TSLRIC pricing will likely be small.

The option valuation arguments are more subtle. We agree options are important. But we also realize that producers investing in long-lived capital have always given their customers particularly valuable options, and do not regard the new situation as substantially different. Nor do we regard it appropriate for the ILECs to be able to charge their CLEC customers for anticipated cooperation breakdown, when the party whose cooperation is most needed is that of the ILEC itself.

With respect to the cost of capital, we find no evidence that the CAPM has failed to properly compensate investors for option values. It is rather like the Bourgeois Gentleman who discovers that he has been speaking prose *all of his life*. So has the CAPM been adjusting the cost of capital to compensate investors for options given to customers. Hausman provides no empirical evidence that the "options" view of investment should change our views on the cost of capital (as opposed to improving our understanding of why the cost of capital is higher for some firms than for others), and we demonstrated that his main piece of evidence for high option values (his interpretation of Summer's research) reflected a surprising confusion over real versus nominal rates of return. Adjustments to the cost of capital are in order in only two circumstances. First, if the CLEC is willing to commit for services on more than a spot market basis, that is, to buy the option from the ILEC and give it to customers itself, price should be lower, reflecting that the ILEC no longer bears this risk. Second, if doing business with the CLEC is likely to result in lower capacity utilization for the ILEC, then price should be adjusted up. But in this case, we must ask why capacity utilization will be affected and be certain that the appropriate price or other contractual adjustment does not worsen incentives to cooperate.

We have demonstrated that Hausman provides no empirical or theoretical basis for his proposed massive increases in capital recovery for TSLRIC prices. Nonetheless, the costs of network elements will be at least partially sunk, and we do not argue that this fact should be ignored. In any event, a modest increase in LEC hurdle rates above the pre-1996 cost of capital may be warranted simply on traditional CAPM grounds: a move from a sheltered monopoly environment to a more competitive environment exposes the shareholders of the firm to increased nondiversifiable risk. Risks that used to be borne by ratepayers are now (or should be) borne by shareholders. In that regard, it is worth noting that the costs of capital in the Hatfield model are in fact considerably higher than the costs of capital LECs have been allowed to earn historically.

That is because LEC allowed rates of return are *nominal* rates of return (typically in the 9-11% range²⁷), whereas Hatfield's cost of capital (around 10% with variations across LECs) is a *real* cost of capital,²⁸ and is therefore equivalent to a 13 - 14% *nominal* cost of capital. Thus Hatfield's cost of capital is already 30-50% higher than rates of return typically allowed by state regulators.

Building an option value into the capital recovery factor implies that the seller (the ILEC), bears all the risk and is compensated with a higher monthly rental price for its facilities.²⁹ At the other extreme, the buyer could commit to pay for the capacity whether he uses it or not. In that case the seller deserves no option premium (indeed, customers making commitments are entitled to discounts relative to customers who do not commit) because the buyer is bearing the entire cost of uncertainty. Real-world competitive markets exhibit a wide variety of risk sharing via contract between these two extremes. The appropriate degree of risk sharing need not ordinarily be imposed by an outsider in the ordinary commercial context, where the buyer and seller have a joint interest in consummating the transaction. Reliance on purely private agreement is not likely to work here, however, because the ILEC has no incentive to reach agreement. Thus, while it is not unreasonable that customers bear some of the risks associated with long-lived investment to provide unbundled elements, left to their own devices the LECs' optimal strategy is to hold out for contract terms so onerous that the demand for unbundled elements is kept to the minimum necessary for the LEC to be allowed to enter long distance service. The solution, perhaps, is to examine otherwise similar situations where the LEC had an ordinary commercial motivation to reach an agreement with a customer, and pattern up-front payments, contract lengths and cancellation penalties for the CLECs on the terms and penalties in similar contracts.³⁰ For

²⁷See *Utility Regulatory Policy in the United States and Canada*, 1993-94 Compilation, National Association of Regulatory Utility Commissioners, Table 120 at p. 292.

²⁸Hatfield's model selects a uniform, multiperiod price, with no adjustments for either changes in the purchasing power of money (general inflation would reduced the value of future revenues) or for changes in future variable input prices.

²⁹If market prices are constrained to the level of the marginal costs of new entrants who obtain elements at TSLRIC-based prices from the ILEC, then it is very important not to overestimate those TSLRIC-based costs. If the ILEC has a 90% market share, and the entrants have a 10% share, a small overcharge in TSLRIC prices to the entrant results in overcharges to the entire market, and not just to the 10% of the market served by entrants.

³⁰Another possibility is to require the CLEC to sign a long term lease covering the useful lives of the assets it wants to rent. They could resell those rights later, but they, not the ILEC, would then suffer any resale loss. The problem is that the market for resold capacity may be a very thin one, and one where the ILEC possesses monopsony power. It seems likely that the ILEC will often have the highest value on facilities abandoned by a CLEC whose entry attempt failed, since the ILEC will have a network covering the entire region, whereas other CLECs, if

example, the offering of CENTREX entailed major facilities investments by the LECs in switching, transport, and loop capacity (i.e., facilities of the type the CLECs will need). The LECs invested in these facilities in advance of contracts with customers, so that they could market CENTREX as a service available to new customers on short notice. Similarly, CENTREX customers could decide later, after the facilities are in place, that they want to convert to PBXs, much as IXC's may decide later to build their own facilities and no longer use the capacity they had rented from the LEC. Thus the required up-front payments, contract duration, cancellation penalties and other terms in CENTREX contracts would appear to be useful benchmarks for reasonable terms and conditions associated with the ILEC's provision of facilities to the CLECs.³¹

there are any, may have networks located or designed in such a way that the abandoned capacity is of low value to them. In that case, the ILEC will win the bidding for the capacity at prices below the value of the capacity to the ILEC. It is by now well accepted that exit barriers are entry barriers. Here, the exit barrier is the likelihood that a CLEC will not receive fair market value for its abandoned investment. As a result, the prospects for socially beneficial entry will be reduced if CLECs had to commit to rent services over an asset's entire useful life.

³¹ If in fact other ratepayers have been protected from cross-subsidy by the terms and conditions of CENTREX contracts, then the ILECs cannot credibly claim that they need greater term commitments than those found in the CENTREX contracts when they sell unbundled elements to CLECs. Nor can they credibly claim that capital recovery factors need to be doubled or trebled (a la Hausman) over the LECs' historic levels before the sale of unbundled elements to the CLECs will be compensatory. Clearly CENTREX investment was sunk, and the LECs faced uncertainty about future demand and technology, so that if it was not appropriate to include an extraordinarily high option value in CENTREX rates it is also not appropriate to do so now for unbundled elements sold to the CLECs.

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